

CPC**COOPERATIVE PATENT CLASSIFICATION****H01M****PROCESSES OR MEANS, e.g. BATTERIES, FOR THE DIRECT CONVERSION OF CHEMICAL INTO ELECTRICAL ENERGY**

(electrochemical processes or apparatus in general [C25](#) ; semiconductor or other solid state devices for converting light or heat into electrical energy [H01L](#) , e.g. [H01L 31/00](#), [H01L 35/00](#), [H01L 37/00](#))

NOTE

This subclass covers galvanic primary or secondary cells or batteries, fuel cells or batteries.

Guide heading:**H01M 2/00****Constructional details or processes of manufacture of the non-active parts**

- H01M 2/02 . Cases, jackets or wrappings ([working of plastics or substances in plastic stateB29](#))
- H01M 2/0202 .. {for small-sized cells or batteries, e.g. miniature battery or power cells, batteries or cells for portable equipment ([H01M 2/025](#) takes precedence) }
- H01M 2/0207 ... { Flat-shaped cells or batteries of flat cells ([H01M 2/0222](#) takes precedence) }
- H01M 2/021 {with both terminals passing through the case or cover }
- H01M 2/0212 {with plate-like or sheet-like terminals ([H01M 2/0215](#) takes precedence) }
- H01M 2/0215 {with window-shaped terminals }
- H01M 2/0217 ... { Cases of prismatic shape }
- H01M 2/022 ... { Cases of cylindrical or round shape }
- H01M 2/0222 { Button or coin cell cases }
- H01M 2/0225 { with cup-shaped terminals }
- H01M 2/0227 { with both cup-shaped terminals }
- H01M 2/023 { with one cup-shaped terminal }
- H01M 2/0232 { with a passing-through terminal ([H01M 2/0235](#) takes precedence) }
- H01M 2/0235 { with a collector centrally disposed in the active mass, e.g. Leclanch cells }
- H01M 2/0237 .. {for large-sized cells or batteries, e.g. L.I.S. batteries, traction or motive power type or standby power batteries ([H01M 2/025](#) takes precedence) }
- H01M 2/024 ... {Details }
- H01M 2/0242 ... {Monobloc manufactured cases comprising multiple compartments }
- H01M 2/0245 ... {Assembly of different cases, i.e. modular battery or cases particularly provided with means for assembling }
- H01M 2/0247 {sealed to each other in a non-detachable manner }
- H01M 2/025 .. {for cells or batteries working under specific conditions such as high temperature, gas diffusion, external electrolyte circulation, external supply of reactants }
- H01M 2/0252 ... {High- temperature cells or batteries, e.g. Na-S cells, Li-Cl₂ cells }
- H01M 2/0255 ... { Hybrid cells or batteries ([H01M 2/0222](#) takes precedence) }

H01M 2/0257	..	{characterised by the material }
H01M 2/026	...	{ for small-sized cells or batteries, batteries or cells for portable equipment }
H01M 2/0262	...	{ for large-sized cells or batteries, batteries or cells for traction or motive power or standby power }
H01M 2/0265	...	{for high-temperature cells }
H01M 2/0267	...	{ of wrappings, outside coatings, jackets around completely closed cell elements }
H01M 2/027	...	{ Casing material forming terminal of the cell }
H01M 2/0272	....	{ characterized by the internal coating or internal conductive layer }
H01M 2/0275	...	{ of flexible envelopes or bags around open cell elements }
H01M 2/0277	...	{ Insulating material (H01M 2/029 takes precedence) }
H01M 2/028	....	{ being one layer }
H01M 2/0282	.....	{ having particulate or reinforced material }
H01M 2/0285	...	{ Conductive material }
H01M 2/0287	...	{ comprising layers }
H01M 2/029	....	{ consisting only of insulating material }
H01M 2/0292	....	{ characterised by the external coating on the casing }
H01M 2/0295	...	{ Composite material consisting of mixed or dispersed phases }
H01M 2/04	..	Lids or covers
H01M 2/0404	...	{ for small-sized cells or batteries, e.g. miniature battery or power cells, batteries or cells for portable equipment (H01M 2/0443 takes precedence) }
H01M 2/0408	....	{ Crimp-sealed cells or batteries; Cells or batteries with turned-over edges }
H01M 2/0413	.....	{ provided with an intermediary sealing member between the crimped or curled edges (H01M 2/0417 takes precedence) }
H01M 2/0417	.....	{ comprising an insulating cover provided with an axial bore for receiving a central current collector }
H01M 2/0421	.....	{ with an external conductive cover }
H01M 2/0426	....	{ with a metallic cover of which the borders are soldered or welded with the case }
H01M 2/043	...	{ for large-sized cells or batteries, e.g. LIS batteries, traction or motive power type or standby power batteries (H01M 2/0443 takes precedence) }
H01M 2/0434	....	{ Methods for assembling case and cover }
H01M 2/0439	.....	{ without provisions for disassembling }
H01M 2/0443	...	{ for cells or batteries working under specific conditions such as high temperature, gas diffusion, external electrolyte circulation, external supply of reactants }
H01M 2/0447	....	{ High-temperature cells or batteries }
H01M 2/0452	....	{ Hybrid cells or batteries }
H01M 2/0456	...	{ characterised by the shape }
H01M 2/046	....	{ Disk-like lids for cylindrical batteries }
H01M 2/0465	.....	{ Button cell lids }
H01M 2/0469	....	{ Lids for flat or sheet-like batteries }
H01M 2/0473	....	{ Lids for prismatic cells }
H01M 2/0478	...	{ characterised by the material }

H01M 2/0482	....	{ Insulating materials }
H01M 2/0486	....	{ Conducting materials }
H01M 2/0491	....	{ characterised by the coating }
H01M 2/0495	.....	{ Conductive coating material }
H01M 2/06	..	Arrangements for introducing electric connectors into or through cases
H01M 2/065	...	{ using glass or ceramic sealing material }
H01M 2/08	..	Sealing materials
H01M 2/10	.	Mountings Suspension devices Shock absorbers Transport or carrying devices Holders (structural combination of accumulators with charging apparatus H01M 10/46)
H01M 2/1005	..	{ Carrying devices }
H01M 2/1011	...	{ using the terminals or connecting links }
H01M 2/1016	..	{ Cabinets, cases, fixing devices, adapters, racks or battery packs }
H01M 2/1022	...	{ for miniature batteries or batteries for portable equipment (batteries in portable systems H01M 2220/30) }
H01M 2/1027	....	{ with the possibility of incorporating batteries of different sizes }
H01M 2/1033	.....	{ providing adapters around the batteries }
H01M 2/1038	....	{ for button cells }
H01M 2/1044	.....	{ forming a whole with or incorporated in or fixed to the electronic appliance }
H01M 2/105	....	{ for cells of cylindrical configuration }
H01M 2/1055	.....	{ forming a whole with or incorporated in or fixed to the electronic appliance }
H01M 2/1061	....	{ for cells of prismatic configuration or for sheet-like batteries }
H01M 2/1066	.....	{ forming a whole with or incorporated in or fixed to the electronic appliance }
H01M 2/1072	...	{ for starting, lighting or ignition batteries; Vehicle traction batteries; Stationary or load leading batteries (batteries in stationary systems H01M 2220/10 , batteries in motive systems H01M 2220/20) }
H01M 2/1077	....	{ Racks, groups of several batteries (H01M 2/1088 takes precedence) }
H01M 2/1083	....	{ Fixing on vehicles }
H01M 2/1088	....	{ for accumulators working at high temperature }
H01M 2/1094	..	{ Particular characteristics of materials used to isolate the battery from its environment, e.g. thermal insulation, corrosion resistance, pressure resistance, electrolyte leakage }
H01M 2/12	.	Vent plugs or other mechanical arrangements for facilitating escape of gases
H01M 2/1205	..	{ Vent arrangements incorporated in vent plugs or multiplug systems detachable from the battery or cell }
H01M 2/1211	...	{ Multiplug systems or arrangements; Plurality of plugs surrounded by a common cover }
H01M 2/1217	....	{ in the shape of a one-piece member }
H01M 2/1223	..	{ Vent arrangements of resealable design (H01M 2/1205 , H01M 2/1247 - H01M 2/1294 take precedence) }

- H01M 2/1229 . . . {comprising a deformable, elastic or flexible valve member }
- H01M 2/1235 . . { Emergency or safety arrangements of non-resealable design ([H01M 2/1205](#), [H01M 2/1247-H01M 2/1294](#) take precedence) }
- H01M 2/1241 . . . {in the form of rupturable membranes or weakened parts, e.g. pierced with the aid of a sharp member }
- H01M 2/1247 . . {Explosion- or splash-preventing means contained in the head space of the battery, e.g. means floating on the electrolyte }
- H01M 2/1252 . . {comprising elongated, tortuous or labyrinth-shaped exhaust passages in the battery cover or case; Double cover vent systems }
- H01M 2/1258 . . { containing electrolyte neutralising or absorbing means }
- H01M 2/1264 . . { comprising gas-pervious parts or elements }
- H01M 2/127 . . . { as flame arrester or ignition preventing means }
- H01M 2/1276 . . { Spring-loaded vent valves }
- H01M 2/1282 . . { Thermally responsive or sensitive vent means }
- H01M 2/1288 . . { Film- or sheet-like elastic valve members optionally coated with non-drying glue }
- H01M 2/1294 . . { Slit, perforated or punctured elastic valve members }

- H01M 2/14 . Separators
Membranes
Diaphragms
Spacing elements
- H01M 2/145 . . { Manufacturing processes }
- H01M 2/16 . . characterised by the material
- H01M 2/1606 . . . {comprising fibrous material }
- H01M 2/1613 {Inorganic fibrous material }
- H01M 2/162 {Organic fibrous material }
- H01M 2/1626 {Natural fibres, e.g. cotton, cellulose }
- H01M 2/1633 {Mixtures of inorganic and organic fibres }
- H01M 2/164 . . . {comprising non-fibrous material ([H01M 2/1606](#) takes precedence) }
- H01M 2/1646 {Inorganic non-fibrous material }
- H01M 2/1653 {Organic non-fibrous material }
- H01M 2/166 {Mixtures of inorganic and organic non-fibrous material }
- H01M 2/1666 . . . {comprising a non-fibrous layer and a fibrous layer superimposed on one another }
- H01M 2/1673 . . . {Electrode-separator combination }
- H01M 2/168 { with adhesive layers between electrodes and separators }
- H01M 2/1686 . . . { Separators having two or more layers of either fibrous or non-fibrous materials }
- H01M 2/1693 . . . {Wood }
- H01M 2/18 . . characterised by the shape
- H01M 2/185 . . . { Separators made of one single microscopic fiber }

- H01M 2/20 . Current conducting connections for cells
- H01M 2/202 . . {Interconnectors for or interconnection of the terminals of adjacent or distinct batteries or cells }
- H01M 2/204 . . . {of small-sized cells or batteries, e.g. miniature battery or power cells, batteries }

- or cells for portable equipment }
- H01M 2/206 . . . {of large-sized cells or batteries, e.g. L.I.S. batteries, traction or motive power type or standby power batteries }
- H01M 2/208 . . . {for cells or batteries working under specific conditions such as high temperature, gas diffusion, external electrolyte circulation, external supply of reactants }
- H01M 2/22 . . Fixed connections, i.e. not intended for disconnection
- H01M 2/24 . . . Intercell connections through partitions, e.g. in a battery case
- H01M 2/26 . . . Electrode connections
- H01M 2/263 {Electrode connections overlying wounded or folded electrode stacks }
- H01M 2/266 {Interconnections of several platelike electrodes in parallel, e.g. electrode pole straps or bridges }
- H01M 2/28 for lead-acid accumulators
- H01M 2/30 . . Terminals
- H01M 2/302 . . . {Terminal post members on carbon electrodes; Machines or processes for applying said terminal post members, e.g. capping of carbon rods }
- H01M 2/305 . . . {Poles or terminals for L.I.S, traction or motive power type or standby power batteries }
- H01M 2/307 {the poles being connected and passing through hollow metallic terminals, e.g. terminal bushings }
- H01M 2/32 . . Methods or arrangements for affording protection against corrosion
Selection of materials therefor
- H01M 2/34 . . with provision for preventing undesired use or discharge, { e.g. complete cut of current (safety devices [H01M 2200/00](#)) }
- H01M 2/341 . . . { Anti-theft provisions }
- H01M 2/342 . . . {Protection against polarity reversal }
- H01M 2/344 . . . {Guarantee labels or covers }
- H01M 2/345 . . . { in response to pressure }
- H01M 2/347 . . . { in response to shock }
- H01M 2/348 . . . { in response to temperature }
- H01M 2/36 . . arrangements for filling, topping-up or emptying cases with or of liquid, e.g. for filling with electrolytes, for washing-out
- H01M 2/361 . . {Filling of small-sized cells or batteries, e.g. miniature battery or power cells, batteries or cells for portable equipment }
- H01M 2/362 . . { Filling or topping up of large-sized cells or batteries, e.g. L.I.S. batteries, traction or motive power type or standby power batteries }
- H01M 2/364 . . {Removing or drainage of electrolyte; Cleaning battery or cell cases }
- H01M 2/365 . . { means or methods for closing or sealing the liquid supply hole }
- H01M 2/367 . . { with means for preventing spilling of liquid or electrolyte , e.g. when the battery is tilted or turned over }
- H01M 2/368 . . . { by closing the vent passages with a valve }
- H01M 2/38 . . Arrangements for moving electrolytes
- H01M 2/385 . . { Electrolyte stirring by action of gases on or in the electrolyte }
- H01M 2/40 . . with external circulating path ([H01M 8/04](#) takes precedence)

H01M 4/00

Electrodes (electrodes for electrolytic processes [C25](#) , { electrodes for hybrid or electric double capacitor [H01G 11/22](#) })

- H01M 4/02 . Electrodes composed of or comprising active material
- H01M 4/04 .. Processes of manufacture in general
 - H01M 4/0402 ... { Methods of deposition of the material }
 - H01M 4/0404 { by coating on electrode collectors }
 - H01M 4/0407 { by coating on an electrolyte layer }
 - H01M 4/0409 { by a doctor blade method, slip-casting or roller coating }
 - H01M 4/0411 { by extrusion }
 - H01M 4/0414 { by screen printing }
 - H01M 4/0416 { involving impregnation with a solution, dispersion, paste or dry powder ([H01M 4/0438](#) takes precedence) }
 - H01M 4/0419 { involving spraying }
 - H01M 4/0421 { involving vapour deposition }
 - H01M 4/0423 { Physical vapour deposition }
 - H01M 4/0426 { Sputtering }
 - H01M 4/0428 { Chemical vapour deposition }
 - H01M 4/043 ... { involving compressing or compaction }
 - H01M 4/0433 { Molding }
 - H01M 4/0435 { Rolling or calendering }
 - H01M 4/0438 ... { by electrochemical processing (electroless electrochemical plating [C23C 18/54](#)) }
 - H01M 4/044 { Activating, forming or electrochemical attack of the supporting material }
 - H01M 4/0442 { Anodisation, Oxidation (electrolytic coating by anodisation [C25D 9/00](#)) }
 - H01M 4/0445 { Forming after manufacture of the electrode, e.g. first charge, cycling }
 - H01M 4/0447 { of complete cells or cells stacks }
 - H01M 4/045 { Electrochemical coating; Electrochemical impregnation }
 - H01M 4/0452 { from solutions }
 - H01M 4/0454 { from melts }
 - H01M 4/0457 { from dispersions or suspensions; Electrophoresis }
 - H01M 4/0459 { Electrochemical doping, intercalation, occlusion or alloying }
 - H01M 4/0461 { Electrochemical alloying }
 - H01M 4/0464 { Electro organic synthesis }
 - H01M 4/0466 { Electrochemical polymerisation }
 - H01M 4/0469 { Electroforming a self-supporting electrode; Electroforming of powdered electrode material }
 - H01M 4/0471 ... { involving thermal treatment, e.g. firing, sintering, backing particulate active material, thermal decomposition, pyrolysis }
 - H01M 4/0473 ... { Filling tube-or pockets type electrodes; Applying active mass in cup-shaped terminals }
 - H01M 4/0476 { with molten material }
 - H01M 4/0478 { with dispersions, suspensions or pastes }

H01M 4/048	....	{ with dry powder }
H01M 4/0483	...	{ by methods including the handling of a melt (H01M 4/0438 , take precedence) }
H01M 4/0485	....	{ Casting }
H01M 4/0488	....	{ Alloying }
H01M 4/049	...	{ Manufacturing of an active layer by chemical means }
H01M 4/0492	....	{ Chemical attack of the support material }
H01M 4/0495	....	{ Chemical alloying }
H01M 4/0497	....	{ Chemical precipitation }
H01M 4/06	..	Electrodes for primary cells
H01M 4/08	...	Processes of manufacture
H01M 4/10	....	of pressed electrodes with central core, i.e. dollies
H01M 4/12	....	of consumable metal or alloy electrodes (use of alloy compositions as active materials H01M 4/38)
H01M 4/13	..	Electrodes for accumulators with non-aqueous electrolyte, e.g. for lithium-accumulators Processes of manufacture thereof

NOTE

This group does not cover electrodes for accumulators working at high temperatures, e.g. molten sodium electrodes, which subject matter is classified in group [H01M 10/39](#)

H01M 4/131	...	Electrodes based on mixed oxides or hydroxides, or on mixtures of oxides or hydroxides, e.g. LiCoOx
H01M 4/1315	....	containing halogen atoms, e.g. LiCoOxFy
H01M 4/133	...	Electrodes based on carbonaceous material, e.g. graphite-intercalation compounds or CFx
H01M 4/134	...	Electrodes based on metals, Si or alloys
H01M 4/136	...	Electrodes based on inorganic compounds other than oxides or hydroxides, e.g. sulfides, selenides, tellurides, halogenides or LiCoFy
H01M 4/137	...	Electrodes based on electro-active polymers
H01M 4/139	...	Processes of manufacture
H01M 4/1391	....	of electrodes based on mixed oxides or hydroxides, or on mixtures of oxides or hydroxides, e.g. LiCoOx
H01M 4/13915	.....	containing halogen atoms, e.g. LiCoOxFy
H01M 4/1393	....	of electrodes based on carbonaceous material, e.g. graphite-intercalation compounds or CFx
H01M 4/1395	....	of electrodes based on metals, Si or alloys
H01M 4/1397	....	of electrodes based on inorganic compounds other than oxides or hydroxides, e.g. sulfides, selenides, tellurides, halogenides or LiCoFy
H01M 4/1399	....	of electrodes based on electro-active polymers
H01M 4/14	..	Electrodes for lead-acid accumulators
H01M 4/16	...	Processes of manufacture
H01M 4/18	....	of Planté electrodes
H01M 4/20	....	of pasted electrodes
H01M 4/21	.....	Drying of pasted electrodes

H01M 4/22	....	Forming of electrodes
H01M 4/23	.....	Drying or preserving electrodes after forming
H01M 4/24	..	Electrodes for alkaline accumulators
H01M 4/242	...	{Hydrogen storage electrodes }
H01M 4/244	...	{Zinc electrodes }
H01M 4/246	...	{Cadmium electrodes }
H01M 4/248	...	{Iron electrodes }
H01M 4/26	...	Processes of manufacture
H01M 4/28	....	Precipitating active material on the carrier
H01M 4/29	.....	by electrochemical methods
H01M 4/30	....	Pressing
H01M 4/32	...	Nickel oxide or hydroxide electrodes
H01M 4/34	...	Silver oxide or hydroxide electrodes
H01M 4/36	..	Selection of substances as active materials, active masses, active liquids { (electrode materials of hybrid or double layer capacitors H01G 11/30-H01G 11/50) }
H01M 4/362	...	{ Composites }
H01M 4/364	....	{ as mixtures }
H01M 4/366	....	{ as layered products }
H01M 4/368	...	{ Liquid depolarisers }
H01M 4/38	...	of elements or alloys
H01M 4/381	....	{ Alkaline or alkaline earth metals elements (H01M 4/40 takes precedence) }
H01M 4/382	.....	{ Lithium (H01M 4/405 takes precedence) }
H01M 4/383	....	{Hydrogen absorbing alloys }
H01M 4/385	.....	{ of the type LaNi5 }
H01M 4/386	....	{ Silicon or alloys based on silicon }
H01M 4/387	....	{ Tin or alloys based on tin }
H01M 4/388	....	{ Halogens }
H01M 4/40	....	Alloys based on alkali metals
H01M 4/405	.....	{ Alloys based on lithium }
H01M 4/42	....	Alloys based on zinc
H01M 4/44	....	Alloys based on cadmium
H01M 4/46	....	Alloys based on magnesium or aluminium
H01M 4/463	.....	{ Aluminium based }
H01M 4/466	.....	{ Magnesium based }
H01M 4/48	...	of inorganic oxides or hydroxides
H01M 4/481	....	{ of mercury }
H01M 4/483	....	{ for non-aqueous cells (H01M 4/485 takes precedence) }
H01M 4/485	....	of mixed oxides or hydroxides for inserting or intercalating light metals, e.g. LiTi2O4 or LiTi2OxFy (H01M 4/505 , H01M 4/525 take precedence)
H01M 4/50	....	of manganese
H01M 4/502	.....	{ for non-aqueous cells (H01M 4/505 takes precedence) }
H01M 4/505	.....	of mixed oxides or hydroxides containing manganese for inserting or

		intercalating light metals, e.g. LiMn_2O_4 or $\text{LiMn}_2\text{O}_x\text{F}_y$
H01M 4/52	....	of nickel, cobalt or iron
H01M 4/521	.....	{of iron for aqueous cells }
H01M 4/523	.....	{ for non-aqueous cells (H01M 4/525 takes precedence) }
H01M 4/525	.....	of mixed oxides or hydroxides containing iron, cobalt or nickel for inserting or intercalating light metals, e.g. LiNiO_2 , LiCoO_2 or LiCoO_xF_y
H01M 4/54	....	of silver
H01M 4/56	....	of lead
H01M 4/57	.....	of "Grey lead", i.e. powders containing lead and lead oxide
H01M 4/58	...	of inorganic compounds other than oxides or hydroxides, e.g. sulfides, selenides, tellurides, halogenides or LiCoF_y
H01M 4/5805	....	{ Phosphides }
H01M 4/581	....	{Chalcogenides or intercalation compounds thereof }
H01M 4/5815	.....	{ Sulfides }
H01M 4/582	....	{Halogenides }
H01M 4/5825	....	{ Oxygenated metallic slats or polyanionic structures, e.g. borates, phosphates, silicates, olivines }

NOTE

Polyanionic structures comprises elements not changing oxidation state during electrochemical reaction, e.g. P, Si, B

H01M 4/583	....	Carbonaceous material, e.g. graphite-intercalation compounds or CF_x
H01M 4/5835	.....	{ Comprising fluorine or fluoride salts }
H01M 4/587	.....	for inserting or intercalating light metals
H01M 4/60	...	of organic compounds
H01M 4/602	....	{ Polymers }
H01M 4/604	.....	{ containing aliphatic main chain polymers }
H01M 4/606	.....	{ containing aromatic main chain polymers }
H01M 4/608	.....	{ containing heterocyclic rings }
H01M 4/62	..	Selection of inactive substances as ingredients for active masses, e.g. binders, fillers
H01M 4/621	...	{Binders }
H01M 4/622	....	{ being polymers }
H01M 4/623	.....	{ fluorinated polymers }
H01M 4/624	...	{Electric conductive fillers }
H01M 4/625	....	{Carbon or graphite }
H01M 4/626	....	{ Metals }
H01M 4/627	...	{Expanders for lead-acid accumulators }
H01M 4/628	...	{ Inhibitors, e.g. gassing inhibitors, corrosion inhibitors }
H01M 4/64	..	Carriers or collectors { (current collector for hybrid or electric double layer capacitors H01G 11/66) }
H01M 4/66	...	Selection of materials
H01M 4/661	....	{ Metal or alloys, e.g. alloy coatings (H01M 4/669 take precedence) }

H01M 4/662	.....	{ Alloys (collectors of lead alloys H01M 4/685) }
H01M 4/663	....	{containing carbon or carbonaceous materials as conductive part, e.g. graphite, carbon fibres }
H01M 4/664	....	{Ceramic materials }
H01M 4/665	....	{ Composites }
H01M 4/666	.....	{ in the form of mixed materials (H01M 4/668 takes precedence) }
H01M 4/667	.....	{ in the form of layers, e.g. coatings }
H01M 4/668	....	{Composites of electroconductive material and synthetic resins }
H01M 4/669	....	{Steels }
H01M 4/68	....	for use in lead-acid accumulators
H01M 4/685	.....	{Lead alloys }
H01M 4/70	...	characterised by shape or form
H01M 4/72	....	Grids
H01M 4/73	.....	for lead-acid accumulators, e.g. frame plates
H01M 4/74	.....	Meshes or woven material Expanded metal
H01M 4/742	.....	{ perforated material }
H01M 4/745	.....	{Expanded metal }
H01M 4/747	.....	{ Woven material }
H01M 4/75	....	Wires, rods or strips
H01M 4/76	....	Containers for holding the active material, e.g. tubes, capsules
H01M 4/762	.....	{Porous or perforated metallic containers }
H01M 4/765	.....	{Tubular type or pencil type electrodes; tubular or multitubular sheaths or covers of insulating material for said tubular-type electrodes }
H01M 4/767	.....	{ Multitubular sheaths or covers }
H01M 4/78	....	Shapes other than plane or cylindrical, e.g. helical
H01M 4/80	....	Porous plates, e.g. sintered carriers
H01M 4/801	.....	{ Sintered carriers }
H01M 4/803	.....	{ of only powdered material }
H01M 4/805	.....	{ of powdered and fibrous material }
H01M 4/806	.....	{ Nonwoven fibrous fabric containing only fibres }
H01M 4/808	.....	{Foamed, spongy materials }
H01M 4/82	...	Multi-step processes for manufacturing carriers for lead-acid accumulators (single step processes see the relevant subclasses, e.g. B21D ; B22D)
H01M 4/84	....	involving casting
H01M 4/86	.	Inert electrodes with catalytic activity, e.g. for fuel cells
H01M 4/8605	..	{Porous electrodes }
H01M 4/861	...	{ with a gradient in the porosity }
H01M 4/8615	...	{Bifunctional electrodes for rechargeable cells }
H01M 4/8621	...	{containing only metallic or ceramic material, e.g. made by sintering or sputtering }
H01M 4/8626	...	{characterised by the form }
H01M 4/8631	....	{Bipolar electrodes }

H01M 4/8636	..	{ with a gradient in another property than porosity (H01M 4/861 takes precedence) }
H01M 4/8642	...	{ Gradient in composition }
H01M 4/8647	..	{ consisting of more than one material, e.g. consisting of composites }
H01M 4/8652	...	{ as mixture }
H01M 4/8657	...	{ layered }
H01M 4/8663	..	{ Selection of inactive substances as ingredients for catalytic active masses, e.g. binders, fillers }
H01M 4/8668	...	{ Binders }
H01M 4/8673	...	{ Electrically conductive fillers }
H01M 4/88	..	Processes of manufacture
H01M 4/8803	...	{ Supports for the deposition of the catalytic active composition (H01M 4/90 takes precedence) }

WARNING

Groups [H01M 4/8803](#) to [H01M 4/8896](#) are not complete, pending a reorganization. See also [H01M 4/88](#), [H01M 4/88F](#), [H01M 8/10B2A](#) and [H01M 8/1006](#)

H01M 4/8807	....	{ Gas diffusion layers }
H01M 4/881	....	{ Electrolytic membranes }
H01M 4/8814	....	{ Temporary supports, e.g. decal }
H01M 4/8817	...	{ Treatment of supports before application of the catalytic active composition (coated porous composites H01M 8/0245) }
H01M 4/8821	....	{ Wet proofing }
H01M 4/8825	...	{ Methods for deposition of the catalytic active composition }
H01M 4/8828	....	{ Coating with slurry or ink }
H01M 4/8832	.....	{ Ink jet printing }
H01M 4/8835	.....	{ Screen printing }
H01M 4/8839	.....	{ Painting }
H01M 4/8842	....	{ Coating using a catalyst salt precursor in solution followed by evaporation and reduction of the precursor }
H01M 4/8846	....	{ Impregnation }
H01M 4/885	.....	{ followed by reduction of the catalyst salt precursor }
H01M 4/8853	....	{ Electrodeposition }
H01M 4/8857	....	{ Casting, e.g. tape casting, vacuum slip casting }
H01M 4/886	....	{ Powder spraying, e.g. wet or dry powder spraying, plasma spraying }
H01M 4/8864	....	{ Extrusion }
H01M 4/8867	....	{ Vapour deposition }
H01M 4/8871	.....	{ Sputtering }
H01M 4/8875	...	{ Methods for shaping the electrode into free-standing bodies, like sheets, films or grids, e.g. moulding, hot-pressing, casting without support, extrusion without support }
H01M 4/8878	...	{ Treatment steps after deposition of the catalytic active composition or after shaping of the electrode being free-standing body }

H01M 4/8882	....	{ Heat treatment, e.g. drying, baking }
H01M 4/8885	.....	{ Sintering or firing }
H01M 4/8889	.....	{ Cosintering or cofiring of a catalytic active layer with another type of layer }
H01M 4/8892	....	{ Impregnation or coating of the catalyst layer, e.g. by an ionomer }
H01M 4/8896	....	{ Pressing, rolling, calendering (membrane electrode assemblies H01M 8/1004) }
H01M 4/90	..	Selection of catalytic material
H01M 4/9008	...	{Organic or organo-metallic compounds }
H01M 4/9016	...	{Oxides, hydroxides or oxygenated metallic salts }
H01M 4/9025	....	{ Oxides specially used in fuel cell operating at high temperature, e.g. SOFC }
H01M 4/9033	.....	{ Complex oxides, optionally doped, of the type M_1MeO_3 , M_1 being an alkaline earth metal or a rare earth, Me being a metal, e.g. perovskites }
H01M 4/9041	...	{ Metals or alloys (H01M 4/92 takes precedence) }
H01M 4/905	....	{ specially used in fuel cell operating at high temperature, e.g. SOFC }
H01M 4/9058	.....	{ of noble metals or noble-metal based alloys }
H01M 4/9066	.....	{ of metal-ceramic composites or mixtures, e.g. cermets }
H01M 4/9075	...	{ Catalytic material supported on carriers, e.g. powder carriers (H01M 4/8807 , H01M 4/881 , H01M 4/8814 , H01M 4/925 take precedence) }
H01M 4/9083	....	{ on carbon or graphite }
H01M 4/9091	...	{ Unsupported catalytic particles; loose particulate catalytic materials, e.g. in fluidised state }
H01M 4/92	...	Metals of platinum group (H01M 4/94 , { H01M 4/9058 } take precedence)
H01M 4/921	....	{Alloys or mixtures with metallic elements }
H01M 4/923	....	{Compounds thereof with non-metallic elements }
H01M 4/925	....	{ supported on carriers, e.g. powder carriers }
H01M 4/926	.....	{ on carbon or graphite }
H01M 4/928	....	{ Unsupported catalytic particles; loose particulate catalytic materials, e.g. in fluidised state }
H01M 4/94	..	Non-porous diffusion electrodes, e.g. palladium membranes, ion exchange membranes
H01M 4/96	..	Carbon-based electrodes
H01M 4/98	..	Raney-type electrodes

H01M 6/00**Primary cells
Manufacture thereof****NOTE**

In this group, primary cells are electrochemical generators in which the cell energy is present in chemical form and is not regenerated.

H01M 6/005	.	{ Devices for making primary cells }
H01M 6/02	.	Details (of non-active parts H01M 2/00 ; of electrodes H01M 4/00)

- H01M 6/04 . Cells with aqueous electrolyte
- H01M 6/045 .. { characterised by aqueous electrolyte }
- H01M 6/06 .. Dry cells, i.e. cells wherein the electrolyte is rendered non-fluid
- H01M 6/08 ... with cup shaped electrodes
- H01M 6/085 { of the reversed type, i.e. anode in the centre }
- H01M 6/10 ... with wound or folded electrodes
- H01M 6/103 { Cells with electrode of only one polarity being folded or wound }
- H01M 6/12 ... with flat electrodes

- H01M 6/14 . Cells with non-aqueous electrolyte {H01M 10/36C takes precedence }
- H01M 6/145 .. {containing ammonia }
- H01M 6/16 .. with organic electrolyte (H01M 6/18 , {H01M 10/40 take precedence })
- H01M 6/162 ... {characterised by the electrolyte }
- H01M 6/164 { by the solvent (organic electrolyte solvents H01M 2300/0028) }
- H01M 6/166 {by the solute }
- H01M 6/168 {by additives }
- H01M 6/18 .. with solid electrolyte
- H01M 6/181 ... [N: with polymeric electrolytes (organic polymers electrolytes H01M 2300/0082)
- H01M 6/182 ... { with halogenide as solid electrolyte (halide solid electrolytes H01M 2300/008) }
- H01M 6/183 {with fluoride as solid electrolyte }
- H01M 6/185 ... { with oxides, hydroxides or oxysalts as solid electrolytes (oxides solid electrolyte H01M 2300/0071) }
- H01M 6/186 { Only oxysalts-containing solid electrolytes }
- H01M 6/187 ... { Solid electrolyte characterised by the form (layered solid electrolytes H01M 2300/0094) }
- H01M 6/188 ... {Processes of manufacture }
- H01M 6/20 ... working at high temperature (deferred-action thermal cells H01M 6/36)

- H01M 6/22 . Immobilising of electrolyte

- H01M 6/24 . Cells comprising two different electrolytes

- H01M 6/26 . Cells without oxidising active material, e.g. Volta cells

- H01M 6/28 . Standard cells, e.g. Weston cells

- H01M 6/30 . Deferred-action cells
- H01M 6/32 .. activated through external addition of electrolyte or of electrolyte components
- H01M 6/34 ... Immersion cells, e.g. sea-water cells
- H01M 6/36 .. containing electrolyte and made operational by physical means, e.g. thermal cells (thermoelectric solid state devices H01L 35/00, H01M 37/00)
- H01M 6/38 ... by mechanical means
- H01M 6/385 { by insertion of electrodes }

- H01M 6/40 . Printed batteries, { e.g. thin film batteries }

- H01M 6/42 . Grouping of primary cells into batteries ([H01M 6/40](#) takes precedence)
- H01M 6/425 . . { Multimode batteries, batteries with "reserve cells" }
- H01M 6/44 . . of tubular or cup-shaped cells
- H01M 6/46 . . of flat cells
- H01M 6/48 . . . with bipolar electrodes
- H01M 6/485 . . . { Side-by-side bipolar batteries }

- H01M 6/50 . Methods or arrangements for servicing or maintenance, e.g. maintaining operating temperature { (cells or batteries combined with safety devices [H01M 2200/00](#)) }
- H01M 6/5005 . . { Auxiliary electrodes }
- H01M 6/5011 . . { for several cells simultaneously or successively }
- H01M 6/5016 . . . { Multimode utilisation }
- H01M 6/5022 . . { Arrangements for moving electrodes or separating elements }
- H01M 6/5027 . . { Dummy cells }
- H01M 6/5033 . . { used as charging means for another battery }
- H01M 6/5038 . . { Heating or cooling of cells or batteries }
- H01M 6/5044 . . { Cells or batteries structurally combined with cell condition indicating means ([H01M 2/34](#) takes precedence) }
- H01M 6/505 . . . { Cells combined with indicating means for externally visualisation of the condition, e.g. by change of colour or of light intensity }
- H01M 6/5055 . . . { End of discharge indicated by a voltage step }
- H01M 6/5061 . . . { cells combined with sound indicating means }
- H01M 6/5066 . . { Type recognition }
- H01M 6/5072 . . { Preserving or storing cells }
- H01M 6/5077 . . { Regeneration of reactants or electrolyte }
- H01M 6/5083 . . { Testing apparatus }
- H01M 6/5088 . . { Initial activation; predischARGE; Stabilisation of initial voltage }

- H01M 6/52 . Reclaiming serviceable parts of waste cells or batteries, { e.g. recycling }

H01M 8/00**Fuel cells
Manufacture thereof****NOTE**

Fuel cells are electrochemical generators wherein the reactants are supplied from outside

- H01M 8/002 . { Shape, form of a fuel cell }
- H01M 8/004 . . { Cylindrical, tubular or wound }
- H01M 8/006 . . { Flat }

- H01M 8/008 . { Destruction or recycling of fuel cells }

- H01M 8/02 . Details

H01M 8/0202	..	{ Collectors, separators, interconnectors, e.g. bipolar separators }
H01M 8/0204	...	{ Non-porous and characterised by the material }
H01M 8/0206	....	{Metals or alloys }
H01M 8/0208	.....	{Alloys }
H01M 8/021	.....	{Alloys based on iron }
H01M 8/0213	....	{Gas-tight carbon-containing material }
H01M 8/0215	....	{Glass or ceramic materials }
H01M 8/0217	.....	{Complexed oxides, optionally doped, of the type M1MeO3, M1 being an alkaline earth metal or rare earth metal, Me being a metal, e.g. perovskites }
H01M 8/0219	.....	{Chromium complex oxides }
H01M 8/0221	....	{ Polymers or organic resins }
H01M 8/0223	....	{Composites }
H01M 8/0226	.....	{in the form of mixtures }
H01M 8/0228	.....	{in the form of layered products, e.g. coatings }
H01M 8/023	...	{ Porous and characterised by the material }
H01M 8/0232	....	{ Metals or alloys }
H01M 8/0234	....	{ Carbonaceous material }
H01M 8/0236	....	{ Glass, ceramics or cermets }
H01M 8/0239	....	{ Polymers or organic resins }
H01M 8/0241	....	{ Composites }
H01M 8/0243	.....	{ in the form of mixtures }
H01M 8/0245	.....	{ in the form of layered products, e.g. coatings }
H01M 8/0247	...	{ Porous or non porous and characterised by the form (characterised by a channel configuration H01M 8/0258) }
H01M 8/025	....	{ Semicylindrical }
H01M 8/0252	....	{ Tubular }
H01M 8/0254	....	{ Corrugated or undulate shaped }
H01M 8/0256	....	{ Vias, i.e. connector passing through the separator material }
H01M 8/0258	...	{ Porous or non-porous and characterised by a channel configuration, i.e. by the flow field }
H01M 8/026	....	{ Grooves characteristics, pitch, depth }
H01M 8/0263	....	{ Meander or serpentine path }
H01M 8/0265	....	{ Variable section of reactant channel }
H01M 8/0267	...	{ Heating or cooling facilities in the separators, collectors or interconnectors }
H01M 8/0269	...	{ Separators, collectors or interconnectors including a printed circuit board }
H01M 8/0271	..	{of surrounding electrodes, matrices, membranes or fuel cell elements with sealing or supporting material }
H01M 8/0273	...	{in the form of a frame; Frame materials; Way of attaching to frames }
H01M 8/0276	...	{ Seals characterised by their form }
H01M 8/0278	....	{ O-rings }
H01M 8/028	...	{ Seals characterised by their composition }
H01M 8/0282	....	{ Inorganic material }

- H01M 8/0284 { Organic resins or polymers }
- H01M 8/0286 . . . { Process of seal formation }
- H01M 8/0289 . . { of membranes or electrolyte holding means }
- H01M 8/0291 . . . { Matrices; Diaphragms; Membranes }
- H01M 8/0293 { for immobilising electrolyte solutions }
- H01M 8/0295 { for immobilising electrolyte melts }
- H01M 8/0297 . . { of joining electrodes, reservoir layers, heat exchange units or bipolar separators to each other }

- H01M 8/04 . . Auxiliary arrangements or processes, e.g. for control of pressure, for circulation of fluids
- H01M 8/04007 . . { Arrangements or means or processes related to heat exchange or temperature measurements (methods for controlling fuel cells or fuel cell systems [H01M 8/04298](#)) }
- H01M 8/04014 . . . { by a gaseous fluid or by combustion of reactants, e.g. bigascooling }
- H01M 8/04022 { Heating by combustion }
- H01M 8/04029 . . . { by a liquid fluid }
- H01M 8/04037 . . . { Electrical heating }
- H01M 8/04044 . . . { Coolant purification }
- H01M 8/04052 . . . { Storage of heat in the fuel cell system }
- H01M 8/04059 . . . { Evaporative processes for the cooling of a fuel cell }
- H01M 8/04067 . . . { Heat exchange or temperature measuring elements, thermal insulation, e.g. heat pipes, heat pumps, fins }
- H01M 8/04074 { Heat exchange unit structures specially adapted for fuel cell (heat exchanger [F28](#) , heat exchangers for fuel cells [F28D 2021/0043](#)) }
- H01M 8/04082 . . { Arrangements or means for reactant regulation. E.g. pressure or concentration }
- H01M 8/04089 . . . { of gaseous reactants }
- H01M 8/04097 { with recycling of the reactants ([H01M 8/04119](#), [H01M 8/04104](#) take precedence) }
- H01M 8/04104 { Regulation of differential pressures }
- H01M 8/04111 { Using a compressor turbine assembly }
- H01M 8/04119 { with simultaneous supply or evacuation of electrolyte; Humidifying or dehumidifying }
- H01M 8/04126 { Humidifying }
- H01M 8/04134 { by coolants }
- H01M 8/04141 { by water containing exhaust gases }
- H01M 8/04149 { by diffusion, e.g. making use of membranes }
- H01M 8/04156 { with product water removal }
- H01M 8/04164 { by condensers, gas-liquid separators or filters }
- H01M 8/04171 { using adsorbents, wicks or hydrophilic material }
- H01M 8/04179 { by purging or increasing flow or pressure of reactants }
- H01M 8/04186 . . . { of liquid- or electrolyte-charged reactants }
- H01M 8/04194 { Concentration measuring cells }
- H01M 8/04201 . . . { Reactant storage and supply, e.g. means for feeding, pipes }
- H01M 8/04208 { Cartridges, cryogenic media or cryogenic reservoirs }

H01M 8/04216	....	{ characterised by the choice for a specific material, e.g. carbon, hydride, absorbent }
H01M 8/04223	...	{ Arrangements or means particularly during start-up or shut-down; Depolarisation or activation treatment, e.g. purging; Short-circuiting means for defective fuel cells }
H01M 8/04231	....	{ Purging of the reactants }
H01M 8/04238	....	{ Depolarisation }
H01M 8/04246	....	{ Short circuiting means for defective fuel cells (detection of defective fuel cells H01M 8/04664 , methods for shunting fuel cells H01M 8/04955) }
H01M 8/04253	....	{ Means for solving freezing problems }
H01M 8/04261	....	{ Preventing means for fuel crossover }
H01M 8/04268	....	{ Heating of fuel cells during the start-up of the fuel cells }
H01M 8/04276	..	{ Arrangements or means related to the management of the electrolyte stream, e.g. heat exchange (H01M 8/04119 takes precedence; Treatment of electrolyte residue H01M 8/0693) }
H01M 8/04283	...	{ Supply means of electrolyte to or in matrix-fuel cells }
H01M 8/04291	..	{ Electrolyte- or water-management of solid electrolyte cells (H01M 8/04119 takes precedence) }
H01M 8/04298	..	{ Methods for controlling fuel cells or fuel cell systems (means for control H01M 8/04007 to H01M 8/04291) }
H01M 8/04305	...	{ Modelling, demonstration models of fuel cells, e.g. for training purposes }
H01M 8/04313	...	{ characterised by variables to be detected or calculated, failure or abnormal functionality of the system }
H01M 8/0432	....	{ Temperature including ambient temperature }
H01M 8/04328	.....	{ of anode reactants at the inlet or inside the fuel cell }
H01M 8/04335	.....	{ of cathode reactants at the inlet or inside the fuel cell }
H01M 8/04343	.....	{ of anode exhausts }
H01M 8/0435	.....	{ of cathode exhausts }
H01M 8/04358	.....	{ of the coolant }
H01M 8/04365	.....	{ of other components of a fuel cell or fuel cell stacks }
H01M 8/04373	.....	{ of auxiliary devices, e.g. reformers, compressors, burners }
H01M 8/0438	....	{ Pressure or flow including ambient pressure }
H01M 8/04388	.....	{ of anode reactants at the inlet or inside the fuel cell }
H01M 8/04395	.....	{ of cathode reactants at the inlet or inside the fuel cell }
H01M 8/04402	.....	{ of anode exhausts }
H01M 8/0441	.....	{ of cathode exhausts }
H01M 8/04417	.....	{ of the coolant }
H01M 8/04425	.....	{ at auxiliary devices, e.g. reformers, compressors, burners }
H01M 8/04432	.....	{ Pressure differences, e.g. between anode and cathode }
H01M 8/0444	....	{ Concentrations or densities }
H01M 8/04447	.....	{ of anode reactants at the inlet or inside the fuel cell }
H01M 8/04455	.....	{ of cathode reactants at the inlet or inside the fuel cell }
H01M 8/04462	.....	{ of anode exhausts }
H01M 8/0447	.....	{ of cathode exhausts }

H01M 8/04477	.....	{ of the electrolyte }
H01M 8/04485	.....	{ of the coolant }
H01M 8/04492	....	{ Humidity, moisture or water content including ambient humidity }
H01M 8/045	.....	{ of anode reactants at the inlet or inside the fuel cell }
H01M 8/04507	.....	{ of cathode reactants at the inlet or inside the fuel cell }
H01M 8/04514	.....	{ of anode exhausts }
H01M 8/04522	.....	{ of cathode exhausts }
H01M 8/04529	.....	{ of the electrolyte }
H01M 8/04537	....	{ Electric variables }
H01M 8/04544	.....	{ Voltage }
H01M 8/04552	.....	{ of the individual fuel cell }
H01M 8/04559	.....	{ of fuel cell stacks }
H01M 8/04567	.....	{ of auxiliary devices, e.g. batteries, capacitors }
H01M 8/04574	.....	{ Current }
H01M 8/04582	.....	{ of the individual fuel cell }
H01M 8/04589	.....	{ of fuel cell stacks }
H01M 8/04597	.....	{ of auxiliary devices, e.g. batteries, capacitors }
H01M 8/04604	.....	{ Power, energy, capacity or load }
H01M 8/04611	.....	{ of the individual fuel cell }
H01M 8/04619	.....	{ of fuel cell stacks }
H01M 8/04626	.....	{ of auxiliary devices, e.g. batteries, capacitors }
H01M 8/04634	.....	{ Other electric variables, e.g. resistance or impedance }
H01M 8/04641	.....	{ of the individual fuel cell }
H01M 8/04649	.....	{ of fuel cell stacks }
H01M 8/04656	.....	{ of auxiliary devices, e.g. batteries, capacitors }
H01M 8/04664	....	{ Failure or abnormal functionality }
H01M 8/04671	.....	{ of the individual fuel cell }
H01M 8/04679	.....	{ of fuel cell stacks }
H01M 8/04686	.....	{ of auxiliary devices, e.g. batteries, capacitors }
H01M 8/04694	...	{ characterised by variables to be regulated }
H01M 8/04701	....	{ Temperature }
H01M 8/04708	.....	{ of fuel cell reactants }
H01M 8/04716	.....	{ of fuel cell exhausts }
H01M 8/04723	.....	{ of the coolant }
H01M 8/04731	.....	{ of other components of a fuel cell or fuel cell stacks }
H01M 8/04738	.....	{ of auxiliary devices, e.g. reformer, compressor, burner }
H01M 8/04746	....	{ Pressure or flow }
H01M 8/04753	.....	{ of fuel cell reactants }
H01M 8/04761	.....	{ of fuel cell exhausts }
H01M 8/04768	.....	{ of the coolant }
H01M 8/04776	.....	{ at auxiliary devices, e.g. reformer, compressor, burner }
H01M 8/04783	.....	{ Pressure differences, e.g. between anode and cathode }

H01M 8/04791	....	{ Concentrations or densities }
H01M 8/04798	.....	{ of fuel cell reactants }
H01M 8/04805	.....	{ of fuel cell exhausts }
H01M 8/04813	.....	{ of the coolant }
H01M 8/0482	.....	{ of the electrolyte }
H01M 8/04828	....	{ Humidity, moisture or water content }
H01M 8/04835	.....	{ of fuel cell reactants }
H01M 8/04843	.....	{ of fuel cell exhausts }
H01M 8/0485	.....	{ of the electrolyte }
H01M 8/04858	....	{ Electric variables }
H01M 8/04865	.....	{ Voltage }
H01M 8/04873	.....	{ of the individual fuel cell }
H01M 8/0488	.....	{ of fuel cell stacks }
H01M 8/04888	.....	{ of auxiliary devices, e.g. batteries, capacitors }
H01M 8/04895	.....	{ Current }
H01M 8/04902	.....	{ of the individual fuel cell }
H01M 8/0491	.....	{ of fuel cell stacks }
H01M 8/04917	.....	{ of auxiliary devices, e.g. batteries, capacitors }
H01M 8/04925	.....	{ Power, energy, capacity or load }
H01M 8/04932	.....	{ of the individual fuel cell }
H01M 8/0494	.....	{ of fuel cell stacks }
H01M 8/04947	.....	{ of auxiliary devices, e.g. batteries, capacitors }
H01M 8/04955	.....	{ Turning on/off, shunting of fuel cells or fuel cell system components (arrangements or means during start-up or shut-down H01M 8/04223) }
H01M 8/04962	.....	{ Other electric variables e.g. resistance or impedance }
H01M 8/0497	.....	{ of the individual fuel cell }
H01M 8/04977	.....	{ of fuel cell stacks }
H01M 8/04985	.....	{ of auxiliary devices, e.g. batteries, capacitors }
H01M 8/04992	...	{ characterised by the implementation of the control method by mathematical or computational algorithm, e.g. control feedback loop mechanisms, fuzzy logic, neural networks, artificial intelligence }
H01M 8/06	.	Combination of fuel cell with means for production of reactants or for treatment of residues
H01M 8/0606	..	{Producing gaseous reactants }
H01M 8/0612	...	{from carbon containing material }
H01M 8/0618	....	{ Reforming processes, e.g. autothermal, partial oxidation or steam reforming }
H01M 8/0625	....	{in a modular combined reactor/fuel cell structure }
H01M 8/0631	.....	{ Reactor construction specially adapted for combination reactor/fuel cell (Hydrogen C01B 3/00 , reactors for physicochemical processes B01J 19/00) }
H01M 8/0637	....	{ Direct internal reforming at the anode of the fuel cell }
H01M 8/0643	....	{Gasification of solid fuel }

- H01M 8/065 ... { by dissolution of metals or alloys or by dehydrating metallic substance }
- H01M 8/0656 ... {by electrochemical means ([H01M 8/065](#) takes precedence) }
- H01M 8/0662 .. {Treatment of gaseous reactants or gaseous residues, e.g. cleaning ([humidifying or dehumidifying of gaseous reactants H01M 8/04119](#)) }
- H01M 8/0668 ... { Removal of carbon monoxide or carbon dioxide }
- H01M 8/0675 ... { Removal of sulfur }
- H01M 8/0681 ... { Reactant purification by the use of electrochemical cells }
- H01M 8/0687 ... { Reactant purification by the use of membranes or filters }
- H01M 8/0693 .. {Treatment of the electrolyte residue, e.g. reconcentrating }

- H01M 8/08 . Fuel cells with aqueous electrolytes
- H01M 8/083 .. { Alkaline fuel cells }
- H01M 8/086 .. { Phosphoric acid fuel cells (PAFC) }

- H01M 8/10 . Fuel cells with solid electrolytes
- H01M 8/1002 .. {with anode and cathode gas-diffusion electrodes or electrode layers, e.g. using gaseous or vaporised reactants ([H01M 8/12](#) takes precedence) }
- H01M 8/1004 ... { characterised by the electrode/electrolyte combination }
- H01M 8/1006 { Undulated, corrugated, curved or wave-shaped membrane-electrode-assemblies (MEA) }
- H01M 8/1009 .. {with one of the reactants being liquid, solid or liquid-charged ([H01M 8/12](#) takes precedence) }
- H01M 8/1011 ... { Direct methanol fuel cells (DMFC) }
- H01M 8/1013 ... { Other direct alcohol fuel cells (DAFC) }
- H01M 8/1016 .. {characterised by the electrolyte material ([H01M 8/12](#) takes precedence) }
- H01M 8/1018 ... {Polymeric electrolyte material }
- H01M 8/102 { characterised by the chemical structure of the main chain of the ion conducting polymer (membrane support [H01M 8/1058](#), semi-permeable membrane composition [B01D 71/00](#), ion-exchange membrane [C08J 5/22](#)) }

NOTE

Multiple classification is done when two or more heteroatoms from O, P, N, S, Si are present

- H01M 8/1023 { having only carbon, e.g. Nafion, vinylsulfonic acid, polyarylenes, polystyrenes, polybutadiene-styrene }
- H01M 8/1025 { having only carbon and oxygen, e.g. polyethers, sulfonated-polyetheretherketones [s-PEEK], sulfonated-polysaccharides, sulfonated-celluloses, sulfonated-polyesters]
- H01M 8/1027 { having carbon, oxygen and other atoms, e.g. sulfonated-polyethersulfones [s-PES], sulfonated-polyphenyl-quinoxaline [s-PPQ] }
- H01M 8/103 { having nitrogen, e.g. sulfonated-polybenzimidazoles [s-PBI], polybenzimidazoles with phosphoric acid, sulfonated-polyamides [s-PA], sulfonated polyphosphazenes [s-PPh]]
- H01M 8/1032 { having sulfur, e.g. sulfonated polyphosphazene [s-PPh] }
- H01M 8/1034 { having phosphorous, e.g. sulfonated polyphosphazene [s-PPh] }

H01M 8/1037	.....	{ having silicon, e.g. sulfonated crosslinked polydimethylsiloxane }
H01M 8/1039	....	{ being halogenated ,e.g. Nafion, sulfonated polyvinylidene fluoride }
H01M 8/1041	....	{ Polymer electrolyte composites, mixtures or blends other than copolymers or grafted polymers }
H01M 8/1044	.....	{ Mixtures of polymers with at least one polymer being ionically conductive }
H01M 8/1046	.....	{ Mixtures of polymer and additives }
H01M 8/1048	.....	{ Ion conductive additives, e.g. polybenzimidazole with phosphoric acid, ion conducting particles, heteropolyacids or metal phosphate }
H01M 8/1051	.....	{ Non ion conductive additives, e.g. stabilizers, SiO ₂ , ZrO ₂ }
H01M 8/1053	.....	{ Layers of polymers with at least one layer being ionically conductive }
H01M 8/1055	.....	{ Inorganic layers on the polymer electrolytes, e.g. inorganic coatings }
H01M 8/1058	....	{ characterized by a porous support having no ionic conductive properties (membrane immobilizing electrolyte solutions or melts H01M 8/0293 , H01M 8/0295) }
H01M 8/106	.....	{ Chemical composition of the porous support }
H01M 8/1062	.....	{ Physical properties of the porous support, e.g. porosity, thickness }
H01M 8/1065	....	{ characterized by their form, e.g. perforated, undulated (semi-permeable membranes characterised by their form B01D 69/00) }
H01M 8/1067	....	{ characterized by their physical properties, e.g. porosity, ionic conductivity, thickness }
H01M 8/1069	....	{ characterized by the manufacturing processes (semi-permeable membrane manufacturing processes B01D 67/00 ; manufacture of ion-exchange membrane C08J 5/22) }
H01M 8/1072	.....	{ Chemical reactions, e.g. in-situ polymerisation, in-situ crosslinking }
H01M 8/1074	.....	{ Sol-gel processes }
H01M 8/1076	.....	{ Micromachining techniques, e.g. masking, etching steps, photolithography }
H01M 8/1079	.....	{ Inducing porosity into non porous precursors membranes, e.g. leaching, pore stretching }
H01M 8/1081	.....	{ Starting from polymer solutions, dispersions, slurries other than monomer solutions, dispersions, slurries }
H01M 8/1083	.....	{ Starting from polymer melts other than monomer melts }
H01M 8/1086	.....	{ After-treatment of the membrane other than polymerisation }
H01M 8/1088	.....	{ chemical modification, e.g. sulfonation }
H01M 8/109	.....	{ thermal other than drying, e.g. sintering }
H01M 8/1093	.....	{ mechanical, e.g. pressing, puncturing }
H01M 8/1097	..	{ Fuel cells applied on a support, e.g. miniature fuel cell deposited on a silica support }
H01M 8/12	..	operating at high temperature, e.g. with stabilised ZrO ₂ electrolyte
H01M 8/1206	...	{with the anode and the cathode in the form of gas diffusion electrodes }
H01M 8/1213	....	{characterised by the electrodes, the electrode/electrolyte combination or the supporting material }
H01M 8/122	.....	{ Undulated, corrugated, curved or wave-shaped membrane electrode assemblies (MEA) }
H01M 8/1226	.....	{Supporting layer characteristics }

- H01M 8/1233 . . . {one of the reactants being solid or liquid }
- H01M 8/124 . . . {characterised by the process of manufacturing or by the material of the electrolyte }
- H01M 8/1246 { the electrolyte consisting of oxides (solid oxides ion conductive electrolyte [H01M 2300/0074](#)) }
- H01M 8/1253 { the electrolyte containing zirconium oxide (solid electrolyte based on zirconium oxide [H01M 2300/0077](#)) }
- H01M 8/126 {the electrolyte containing cerium oxide }
- H01M 8/1266 {the electrolyte containing bismuth oxide }
- H01M 8/1273 { Fuel cells with solid halide electrolytes (solid halide electrolyte [H01M 2300/008](#)) }
- H01M 8/1286 . . . { Fuel cells applied on a support, e.g. miniature fuel cells deposited on a silica support }

- H01M 8/14 . Fuel cells with fused electrolytes
- H01M 8/141 . . {the anode and the cathode being gas-permeable electrodes or electrode layers }
- H01M 8/142 . . . {with matrix-supported or semi-solid matrix-reinforced electrolyte }
- H01M 8/143 . . {with liquid, solid or electrolyte-charged reactants }
- H01M 8/144 . . {characterised by the electrolyte material }
- H01M 8/145 . . . {comprising carbonates }
- H01M 8/146 . . { Fuel cells with molten hydroxide (molten hydroxide electrolyte [T01M300/B6H](#)) }
- H01M 8/148 . . {Measures, other than selecting a specific electrode material, to reduce electrode dissolution }

- H01M 8/16 . Biochemical fuel cells, i.e. cells in which micro-organisms function as catalysts

- H01M 8/18 . Regenerative fuel cells
- H01M 8/182 . . {Regeneration by thermal means }
- H01M 8/184 . . {Regeneration by electrochemical means }
- H01M 8/186 . . . {by electrolytic decomposition of the electrolytic solution or the formed water product }
- H01M 8/188 . . . {by recharging of redox couples containing fluids; Redox flow type batteries }

- H01M 8/20 . Indirect fuel cells, e.g. Redox cells ([H01M 8/18](#) takes precedence)

- H01M 8/22 . Fuel cells in which the fuel is based on materials comprising carbon or oxygen or hydrogen and other elements
Fuel cells in which the fuel is based on materials comprising only elements other than carbon, oxygen or hydrogen
- H01M 8/222 . . {Fuel cells in which the fuel is based on compounds containing nitrogen, e.g. hydrazine, ammonia }
- H01M 8/225 . . {Fuel cells in which the fuel is based on materials comprising particulate active material in the form of a suspension, a dispersion, a fluidised bed or a paste }
- H01M 8/227 . . {Dialytic cells or batteries; Reverse electrodialysis cells or batteries }

- H01M 8/24 . Grouping of fuel cells into batteries
- H01M 8/2405 . . {comprising spaced diffusion electrodes or electrode layers with interposed electrolyte layer or electrolyte compartment }

- H01M 8/241 . . . {with solid or matrix-supported electrolyte }
- H01M 8/2415 {External manifolded battery stock ([H01M 8/2425](#), [H01M 8/244](#) take precedence) }
- H01M 8/242 {comprising framed electrodes or intermediary frame-like gaskets ([H01M 8/2425](#), [H01M 8/244](#) take precedence) }
- H01M 8/2425 {High-temperature cells with solid electrolyte }
- H01M 8/243 {of tubular or cylindrical configuration }
- H01M 8/2435 {with monolithic core structure, e.g. honeycombs }
- H01M 8/244 {with matrix-supported molten electrolyte }
- H01M 8/2445 . . . {comprising spaced diffusion electrodes or electrode layers with interposed electrolyte compartment with possible electrolyte supply or circulation }
- H01M 8/245 {comprising framed electrodes or intermediary frame-like gaskets }
- H01M 8/2455 . . {with liquid, solid or electrolyte-charged reactants }
- H01M 8/246 . . . {with framed electrodes or intermediary frame-like gaskets }
- H01M 8/2465 . . {Details of fuel cell stacks }
- H01M 8/247 . . . { Arrangements for tightening a stack, for accommodation of a stack in a tank, for assembling different tanks }
- H01M 8/2475 { Enclosures, casings or containers of fuel cells }
- H01M 8/248 { Compression means of the fuel cell stack }
- H01M 8/2485 . . . {Arrangements for sealing or mounting external manifolds around a stack; Manifold structure and material }
- H01M 8/249 . . {comprising a plurality of stacks, e.g. modular assembly }
- H01M 8/2495 . . . {of fuel cells of different type }

H01M 10/00 Secondary cells

Manufacture thereof

NOTE

Secondary cells are accumulators receiving and supplying electrical energy by means of reversible electrochemical reactions.

- H01M 10/02 . Details ([of non-active parts H01M 2/00](#); [of electrodes H01M 4/00](#))
- H01M 10/04 . Construction or manufacture in general ([H01M 10/12](#), [H01M 10/28](#), [H01M 10/38](#) take precedence)
- H01M 10/0404 . . { Machines for assembling batteries }
- H01M 10/0409 . . . { for cells with wound electrodes }
- H01M 10/0413 . . { Large-sized flat cells or batteries for motive or stationary systems with plate-like electrodes }
- H01M 10/0418 . . . {with bipolar electrodes }
- H01M 10/0422 . . { Cells or battery with cylindrical casing }
- H01M 10/0427 . . . {Button cells }
- H01M 10/0431 . . { Cells with wound or folded electrodes ([H01M 10/045](#) takes precedence) }
- H01M 10/0436 . . { Small-sized flat cells or batteries portable equipment }

- H01M 10/044 . . . {with bipolar electrodes }
- H01M 10/0445 . . { Multimode batteries, e.g. containing auxiliary cells or electrodes switchable in parallel or series connections }
- H01M 10/045 . . { Cells or batteries with folded plate-like electrodes }
- H01M 10/0454 . . . { Cells or batteries with electrodes of only one polarity folded }
- H01M 10/0459 . . { Cells or batteries with folded separator between plate-like electrodes }
- H01M 10/0463 . . { Cells or batteries with horizontal or inclined electrodes }
- H01M 10/0468 . . { Compression means for stacks of electrodes and separators }
- H01M 10/0472 . . { Vertically superposed cells with vertically disposed plates }
- H01M 10/0477 . . { with circular plates }
- H01M 10/0481 . . { Compression means other than compression means for stacks of electrodes and separators }
- H01M 10/0486 . . { Frames for plates or membranes }
- H01M 10/049 . . {Processes for forming or storing electrodes in the battery container }

- H01M 10/05 . Accumulators with non-aqueous electrolyte ([H01M 10/39](#) takes precedence)
- H01M 10/052 . . Li-accumulators
- H01M 10/0525 . . . Rocking-chair batteries, i.e. batteries with lithium insertion or intercalation in both electrodes
Lithium-ion batteries
- H01M 10/054 . . Accumulators with insertion or intercalation of metals other than lithium, e.g. with magnesium or aluminium
- H01M 10/056 . . characterised by the materials used as electrolytes, e.g. mixed inorganic/organic electrolytes { ([electrolytes for hybrid or electric double layer capacitors H01G 11/54](#)) }
- H01M 10/0561 . . . the electrolyte being constituted of inorganic materials only
- H01M 10/0562 Solid materials
- H01M 10/0563 Liquid materials, e.g. for Li-SOCl₂ cells
- H01M 10/0564 . . . the electrolyte being constituted of organic materials only
- H01M 10/0565 Polymeric materials, e.g. gel-type or solid-type
- H01M 10/0566 Liquid materials
- H01M 10/0567 characterised by the additives
- H01M 10/0568 characterised by the solutes
- H01M 10/0569 characterised by the solvents
- H01M 10/058 . . Construction or manufacture
- H01M 10/0583 . . . of accumulators with folded construction elements except wound ones, i.e. folded positive or negative electrodes or separators, e.g. with "Z"-shaped electrodes or separators
- H01M 10/0585 . . . of accumulators having only flat construction elements, i.e. flat positive electrodes, flat negative electrodes and flat separators
- H01M 10/0587 . . . of accumulators having only wound construction elements, i.e. wound positive electrodes, wound negative electrodes and wound separators

- H01M 10/06 . Lead-acid accumulators ([semi-lead accumulators H01M 10/20](#))
- H01M 10/08 . . Selection of materials as electrolytes
- H01M 10/10 . . . Immobilising of electrolyte

- H01M 10/12 .. Construction or manufacture
- H01M 10/121 ... { Valve regulated lead acid batteries [VRLA] }
- H01M 10/122 ... {Multimode batteries }
- H01M 10/123 ... { Cells or batteries with cylindrical casing }
- H01M 10/124 {Button cells }
- H01M 10/125 ... {Cells or batteries with wound or folded electrodes }
- H01M 10/126 ... {Small-sized flat cells or batteries for portable equipment ([H01M 10/123](#) and [H01M 10/125](#) take precedence) }
- H01M 10/127 {with bipolar electrodes }
- H01M 10/128 ... {Processes for forming or storing electrodes in the battery container }
- H01M 10/14 ... Assembling a group of electrodes or separators
- H01M 10/16 Suspending or supporting electrodes or groups of electrodes in the case
- H01M 10/18 .. with bipolar electrodes

- H01M 10/20 . Semi-lead accumulators, i.e. accumulators in which only one electrode contains lead
- H01M 10/22 .. Selection of materials as electrolytes

- H01M 10/24 . Alkaline accumulators
- H01M 10/26 .. Selection of materials as electrolytes
- H01M 10/28 .. Construction or manufacture
- H01M 10/281 ... {Large cells or batteries with stacks of plate-like electrodes }
- H01M 10/282 {with bipolar electrodes }
- H01M 10/283 ... {Cells or batteries with two cup-shaped or cylindrical collectors ([H01M 10/281](#) takes precedence) }
- H01M 10/285 {Button cells }
- H01M 10/286 ... {Cells or batteries with wound or folded electrodes }
- H01M 10/287 ... {Small-sized flat cells or batteries for portable equipment ([H01M 10/283](#) and [H01M 10/286](#) take precedence) }
- H01M 10/288 ... {Processes for forming or storing electrodes in the battery container }
- H01M 10/30 .. Nickel accumulators ([H01M 10/34](#) takes precedence)
- H01M 10/32 .. Silver accumulators ([H01M 10/34](#) takes precedence)

- H01M 10/34 . Gastight accumulators
- H01M 10/342 .. { Gastight lead accumulators ([H01M 10/121](#) takes precedence) }
- H01M 10/345 .. { Gastight metal hydride accumulators }
- H01M 10/347 ... {with solid electrolyte }

- H01M 10/36 . Accumulators not provided for in groups [H01M 10/05-H01M 10/34](#)
- H01M 10/365 .. {Zinc-halogen accumulators }
- H01M 10/38 .. Construction or manufacture
- H01M 10/39 .. Working at high temperature
- H01M 10/3909 ... { Sodium-sulfur cells }
- H01M 10/3918 { characterised by the electrolyte }
- H01M 10/3927 { Several layers of electrolyte or coatings containing electrolyte }

- H01M 10/3936 { Electrolyte with a shape other than plane or cylindrical }
- H01M 10/3945 { containing additives or special arrangements in the sodium compartment }
- H01M 10/3954 { containing additives or special arrangement in the sulfur compartment }
- H01M 10/3963 { Sealing means between the solid electrolyte and holders }
- H01M 10/3972 { Flexible parts }
- H01M 10/3981 { Flat cells }
- H01M 10/399 . . . { Cells with molten salts }

- H01M 10/42 . . Methods or arrangements for servicing or maintenance of secondary cells or secondary half-cells
- H01M 10/4207 . . {for several batteries or cells simultaneously or sequentially }
- H01M 10/4214 . . {Arrangements for moving electrodes or electrolyte }
- H01M 10/4221 . . { with battery type recognition }
- H01M 10/4228 . . { Leak testing of cells or batteries }
- H01M 10/4235 . . {Safety or regulating additives or arrangements in electrodes, separators or electrolyte ([H01M 10/4242](#) takes precedence) }
- H01M 10/4242 . . {Regeneration of electrolyte or reactants }
- H01M 10/425 . . { Structural combination with electronic components, e.g. electronic circuits integrated to the outside of the casing ([printed circuits H05K 1/00](#)) }
- H01M 10/4257 . . . { Smart batteries, e.g. electronic circuits inside the housing of the cells or batteries }
- H01M 10/4264 . . . { with capacitors }
- H01M 10/4285 . . {Testing apparatus }
- H01M 10/44 . . Methods for charging or discharging ([circuits for charging H02J 7/00](#))
- H01M 10/441 . . . {for several batteries or cells simultaneously or sequentially }
- H01M 10/443 . . . { in response to temperature }
- H01M 10/445 . . . { in response to gas pressure }
- H01M 10/446 . . . { Initial charging measures }
- H01M 10/448 . . . { End of discharge regulating measures }
- H01M 10/46 . . Accumulators structurally combined with charging apparatus ([circuits for charging H02J 7/00](#))
- H01M 10/465 . . . {with solar battery as charging system }
- H01M 10/48 . . Accumulators combined with arrangements for measuring, testing or indicating condition, e.g. level or density of the electrolyte ({[H01M 10/44](#) takes precedence }; indicating or measuring level of liquid in general [G01F 23/00](#); measuring density [G01N](#) , e.g. [G01N 9/00](#); measuring electric variables [G01R](#))
- H01M 10/482 . . . {for several batteries or cells simultaneously or sequentially }
- H01M 10/484 . . . { for measuring electrolyte level, electrolyte density or electrolyte conductivity }
- H01M 10/486 . . . { for measuring temperature }
- H01M 10/488 . . . { Cells or batteries combined with indicating means for externally visualisation of the condition, e.g. by change of colour or of light intensity }
- H01M 10/50 . . Heating or cooling or regulating temperature ([control of temperature in general G05D 23/00](#))
- H01M 10/5002 . . . { Types of temperature regulation }

WARNING

Groups [H01M 10/5002](#) to [H01M 10/5097](#) are not complete, pending reclassification. See also [H01M 10/50](#), [H01M 10/50B](#), [T01M 6/50S2-T01M 6/50S2R](#)

H01M 10/5004	....	{ Cooling or keeping cold }
H01M 10/5006	....	{ Heating or keeping warm }
H01M 10/5008	....	{ Uniformity or distribution of temperature in space }
H01M 10/501	...	{ specially adapted for a specific application }
H01M 10/5012	....	{ Portable devices, e.g. mobiles, cameras, pacemakers }
H01M 10/5014	.....	{ Power tools }
H01M 10/5016	....	{ Vehicles }
H01M 10/5018	....	{ Stationary plants, e.g. power plant buffering, backup power supplies }
H01M 10/502	...	{ Control systems (measurement of temperature H01M 10/486 ; charging and discharging in response to temperature H01M 10/443) }
H01M 10/5022	....	{ characterized by method steps, e.g. algorithms, flow charts, software details }
H01M 10/5024	....	{ based on ambient temperature }
H01M 10/5026	....	{ characterised by the use of reversible temperature sensitive devices, e.g. NTC, PTC, bimetal or by control of the internal current flowing through the battery, e.g. by switching (H01M 2/34 takes precedence; Temperature sensitive safety devices for primary or secondary batteries H01M 2200/10) }
H01M 10/5028	...	{ characterized by the shape of the cells }
H01M 10/503	....	{ Cylindrical }
H01M 10/5032	....	{ Prismatic or flat, e.g. pouch cells }
H01M 10/5034	...	{ Means for temperature regulation having parts combined with the battery }
H01M 10/5036	....	{ characterized by values or quantitative relationships, e.g. ratios, sizes, formulas, concentrations }
H01M 10/5038	....	{ characterized by gradients (temperature gradients H01M 10/5008) }
H01M 10/504	....	{ characterized by electrically insulating, thermally conductive materials }
H01M 10/5042	....	{ inside the innermost case of the battery, e.g. mandrels, electrodes, electrolytes }
H01M 10/5044	....	{ Solid structures for heat-exchange or conduction }
H01M 10/5046	.....	{ Surfaces specially adapted for heat dissipation or radiation, e.g. fins, coatings }
H01M 10/5048	.....	{ Closed pipes transferring heat by thermal conductivity and phase transition, e.g. heat pipes }
H01M 10/5051	.....	{ Terminals or leads }
H01M 10/5053	.....	{ Solid parts specially adapted for heat conduction other than terminals or leads, e.g. rods, plates }
H01M 10/5055	.....	{ arranged between the cells }
H01M 10/5057	.....	{ Solid parts with flow channels or tubes for heat exchange }
H01M 10/5059	.....	{ arranged between the cells }
H01M 10/5061	....	{ Fluids for heat exchange }
H01M 10/5063	.....	{ Gases }

- H01M 10/5065 { freely flowing by convection only }
- H01M 10/5067 { forcedly flowing, e.g. by blowers }
- H01M 10/5069 { Compressed gases }
- H01M 10/5071 { Recirculation or a U-turn in the flow path, i.e. back and forth
([H01M 10/5069](#) takes precedence) }
- H01M 10/5073 [Means within the gas flows giving the gas flows around a cell or a battery a certain direction, e.g. manifolds, baffles, obstacles]
- H01M 10/5075 { Liquids }
- H01M 10/5077 { characterised by flow circuits external to the battery or the battery pack }
- H01M 10/5079 { Fluids undergoing a liquid-gas phase change, e.g. evaporation, condensation ([heat pipes H01M 10/5048](#)) }
- H01M 10/5081 { Electric or electromagnetic means ([H01M 2/34](#) takes precedence) }
- H01M 10/5083 { Resistor heaters (arrangements for heating the battery by its resistance to internal current [H01M 10/5026](#)) }
- H01M 10/5085 { Peltier elements or thermo-electric devices }
- H01M 10/5087 { Thermal insulation or shielding }
- H01M 10/5089 { Heat storage or buffering, e.g. heat capacity, liquid-solid phase changes }
- H01M 10/5091 { Chemical reactions other than electrochemical reactions of the battery, e.g. catalytic heaters, burners }
- H01M 10/5093 ... { Heat exchange relationships between a battery and another system, e.g. air-conditioners, central heating systems, vehicle engines, electronic components, fuel cells, capacitors }
- H01M 10/5095 { the system being an air-conditioner or an engine }
- H01M 10/5097 { the system being an electronic component, e.g. CPU, inverter, capacitor }
- H01M 10/52 .. Removing gases inside the secondary cell, e.g. by absorption ([vent plugs or other mechanical arrangements for facilitating escape of gases H01M 2/12](#))
- H01M 10/523 ... { by recombination on a catalytic material }
- H01M 10/526 ... { by gas recombination on the electrode surface or by structuring the electrode surface to improve gas recombination }

- H01M 10/54 . Reclaiming serviceable parts of waste accumulators

H01M 12/00 Hybrid cells Manufacture thereof

NOTE

Hybrid cells are electrochemical generators having two different types of half-cells, the half-cell being an electrode-electrolyte combination of either a primary, a secondary or a fuel cell.

- H01M 12/005 . { composed of a half-cell of the capacitor type and of a half-cell of the primary or secondary battery type ([hybrid capacitors H01G 9/155](#)) }
- H01M 12/02 . Details ([of non-active parts H01M 2/00](#); [of electrodes H01M 4/00](#))
- H01M 12/04 . composed of a half-cell of the fuel-cell type and of a half-cell of the primary-cell type

	methods or arrangements for servicing or maintenance H01M 6/50)
H01M 12/06	.. with one metallic and one gaseous electrode
H01M 12/065	... {with plate-like electrodes or stacks of plate-like electrodes }
H01M 12/08	. composed of a half-cell of a fuel-cell type and a half-cell of the secondary-cell type (methods or arrangements for servicing or maintenance, e.g. for charging, H01M 10/42)
H01M 12/085	.. {Zinc-halogen cells or batteries }
H01M 14/00	Electrochemical current or voltage generators not provided for in groups H01M 6/00 - H01M 12/00 Manufacture thereof
H01M 14/005	. { Photoelectrochemical storage cells (light sensitive devices H01G 9/20 , semiconductors sensitive to light H01L 131/00) }
H01M 16/00	Structural combinations of different types of electrochemical generators
H01M 16/003	. { of fuel cells with other electrochemical devices, e.g. capacitors, electrolyzers }
H01M 16/006	.. { of fuel cells with rechargeable batteries }
Guide heading:	
H01M 2002/00	Constructional details or processes of manufacture of the non-active parts
H01M 2002/02	. Cases, jackets or wrappings (working of plastics or substances in plastic state B29)
H01M 2002/0202	.. {for small-sized cells or batteries, e.g. miniature battery or power cells, batteries or cells for portable equipment (H01M 2/025 takes precedence) }
H01M 2002/0205	... Cases with a shape not covered by groups H01M 2/0207 to T01M 2/02B6
H01M 2002/0257	.. {characterised by the material }
H01M 2002/0297	... characterised by physical parameters
H01M 2004/00	Electrodes (electrodes for electrolytic processes C25 , { electrodes for hybrid or electric double capacitor H01G 11/22 })
H01M 2004/02	. Electrodes composed of or comprising active material
H01M 2004/021	.. Physical characteristics, e.g. porosity, surface area
H01M 2004/022	.. Electrodes made of one single microscopic fiber
H01M 2004/023	.. Gel electrode
H01M 2004/024	.. Insertable electrodes
H01M 2004/025	.. with shapes other than plane or cylindrical
H01M 2004/026	.. characterised by the polarity
H01M 2004/027	... Negative electrodes
H01M 2004/028	... Positive electrodes

- H01M 2004/029 . . . Bipolar electrodes
- H01M 2004/86 . Inert electrodes with catalytic activity, e.g. for fuel cells
- H01M 2004/8678 . . characterised by the polarity
- H01M 2004/8684 . . . Negative electrodes
- H01M 2004/8689 . . . Positive electrodes
- H01M 2004/8694 . . . Bipolar electrodes

H01M 2006/00

Primary cells

Manufacture thereof

NOTE

In this group, primary cells are electrochemical generators in which the cell energy is present in chemical form and is not regenerated.

- H01M 2006/04 . Cells with aqueous electrolyte
- H01M 2006/06 . . Dry cells, i.e. cells wherein the electrolyte is rendered non-fluid
- H01M 2006/10 . . . with wound or folded electrodes
- H01M 2006/106 Elliptic wound cells
- H01M 2006/50 . Methods or arrangements for servicing or maintenance, e.g. maintaining operating temperature { (cells or batteries combined with safety devices [H01M 2200/00](#)) }
- H01M 2006/5094 . . Aspects relating to capacity ratio of electrolyte/electrodes or anode/cathode

H01M 2008/00

Fuel cells

Manufacture thereof

NOTE

Fuel cells are electrochemical generators wherein the reactants are supplied from outside

- H01M 2008/10 . Fuel cells with solid electrolytes
- H01M 2008/1095 . . Fuel cells with polymeric electrolytes
- H01M 2008/12 . . operating at high temperature, e.g. with stabilised ZrO₂ electrolyte
- H01M 2008/128 . . . Fuel cells with solid halide electrolytes
- H01M 2008/1293 . . . Fuel cells with solid oxide electrolytes
- H01M 2008/14 . Fuel cells with fused electrolytes
- H01M 2008/147 . . Fuel cells with molten carbonates

H01M 2010/00

Secondary cells

Manufacture thereof

NOTE

Secondary cells are accumulators receiving and supplying electrical energy by means of reversible electrochemical reactions.

- H01M 2010/04 . Construction or manufacture in general ([H01M 10/12](#), [H01M 10/28](#), [H01M 10/38](#) take precedence)
- H01M 2010/0495 . . Nanobatteries
- H01M 2010/42 . Methods or arrangements for servicing or maintenance of secondary cells or secondary half-cells
- H01M 2010/425 . . { Structural combination with electronic components, e.g. electronic circuits integrated to the outside of the casing ([printed circuits H05K 1/00](#)) }
- H01M 2010/4271 . . . Battery management systems including electronic circuits, e.g. control of current or voltage to keep battery in healthy state, cell balancing
- H01M 2010/4278 . . . Systems for data transfer from batteries, e.g. transfer of battery parameters to a controller, data transferred between battery controller and main controller
- H01M 2010/4292 . . Aspects relating to capacity ratio of electrodes/electrolyte or anode/cathode

Guide heading:

H01M 2200/00 Safety devices for primary or secondary batteries

- H01M 2200/10 . Temperature sensitive devices
- H01M 2200/101 . . Bimetal
- H01M 2200/103 . . Fuse
- H01M 2200/105 . . NTC
- H01M 2200/106 . . PTC
- H01M 2200/108 . . Normal resistors
- H01M 2200/20 . Pressure-sensitive devices
- H01M 2200/30 . Preventing polarity reversal

Guide heading:

H01M 2220/00 Batteries for particular applications

- H01M 2220/10 . Batteries in stationary systems, e.g. emergency power source in plant
- H01M 2220/20 . Batteries in motive systems, e.g. vehicle, ship, plane
- H01M 2220/30 . Batteries in portable systems, e.g. mobile phone, laptop

Guide heading:

H01M 2250/00

Fuel cells for particular applications

Specific features of fuel cell system

- H01M 2250/10 . Fuel cells in stationary systems, e.g. emergency power source in plant
- H01M 2250/20 . Fuel cells in motive systems, e.g. vehicle, ship, plane
- H01M 2250/30 . Fuel cells in portable systems, e.g. mobile phone, laptop
- H01M 2250/40 . Combination of fuel cells with other energy production systems
- H01M 2250/402 . . Combination of fuel cell with other electric generators ([combination of fuel cells with other electrochemical generator H01M 16/003](#))
- H01M 2250/405 . . Cogeneration of heat or hot water
- H01M 2250/407 . . Combination of fuel cells with mechanical energy generators

Guide heading:

H01M 2300/00

Electrolytes

- H01M 2300/0002 . Aqueous electrolytes
- H01M 2300/0005 . . Acid electrolytes
- H01M 2300/0008 . . . Phosphoric acid-based
- H01M 2300/0011 . . . Sulfuric acid-based
- H01M 2300/0014 . . Alkaline electrolytes
- H01M 2300/0017 . Non-aqueous electrolytes
- H01M 2300/002 . . Inorganic electrolyte
- H01M 2300/0022 . . . Room temperature molten salts
- H01M 2300/0025 . . Organic electrolyte
- H01M 2300/0028 . . . characterised by the solvent
- H01M 2300/0031 Chlorinated solvents
- H01M 2300/0034 Fluorinated solvents
- H01M 2300/0037 Mixture of solvents
- H01M 2300/004 Three solvents
- H01M 2300/0042 Four or more solvents
- H01M 2300/0045 . . . Room temperature molten salts comprising at least one organic ion
- H01M 2300/0048 . . Molten electrolytes used at high temperature
- H01M 2300/0051 . . . Carbonates
- H01M 2300/0054 . . . Halogenides
- H01M 2300/0057 Chlorides
- H01M 2300/006 . . . Hydroxides
- H01M 2300/0062 . . . Nitrates
- H01M 2300/0065 . . Solid electrolytes

- H01M 2300/0068 . . . inorganic
- H01M 2300/0071 Oxides
- H01M 2300/0074 Ion conductive at high temperature
- H01M 2300/0077 based on zirconium oxide
- H01M 2300/008 Halides
- H01M 2300/0082 . . . Organic polymers

- H01M 2300/0085 . Immobilising or gelification of electrolyte

- H01M 2300/0088 . Composites
- H01M 2300/0091 . . in the form of mixtures
- H01M 2300/0094 . . in the form of layered products, e.g. coatings
- H01M 2300/0097 . . . with adhesive layers